REMARKS

Claims 1-36 were pending in this case except that Claims 34 and 36 were earlier withdrawn. Of the remaining claims, Claims 1-5, 7-28 and 30-33 stand rejected and Claims 6 and 29 were objected to but indicated as being allowable if amended to include the limitations of the base claim and any intervening claims.

New Claims 37-38 Allowable

New independent Claims 37 and 38 are submitted herewith. Claim 37 includes all the limitations of Claim 1 as earlier pending combined with those of Claim 6 indicated as being allowable and intervening Claim 3. Therefore new Claim 37 is allowable. Similarly, new Claim 38 includes all the limitations of Claim 29, earlier indicated as being allowable, and those of base Claim 23 as earlier pending and intervening Claim 26.

Rejections

The other claims stand rejected. Claims 1-3, 7, 8 and 12 stand rejected under 35 U.S.C. § 102 as anticipated by Jerman.

Claims 1, 4, 13-15, 23, 24, 26, 27 and 30-32 stand rejected under 35 U.S.C. § 102 as anticipated by Anthon.

Claims 5, 20-22, 25 and 28 stand rejected under 35 U.S.C. § 103 as unpatentable over Anthon in view of Suganuma.

Claims 9-11 stand rejected under 35 U.S.C. § 103 as unpatentable over Anthon in view of Clark.

Claims 16-19 stand rejected under 35 U.S.C. § 103 as unpatentable over Anthon in view of Jerman.

Claim 33 stands rejected under 35 U.S.C. § 103 as unpatentable over Anthon in view of Jerman and Suganuma.

Claim Rejections Overcome

Claim 1 has been amended so its final clause recites "where a distance between the gain medium and the diffraction grating is adjustable along an axis parallel to a direction of the light emitted by the gain medium, by an actuator which changes the distance only along that axis."

Claim 1 now includes the subject matter of original Claim 3 and also is specific that the actuator "changes distance only along that axis." (Emphasis added.) Thus Claim 1, in addition to reading on Claim 3, also reads on Figs. 3 and 4, see page 5 of the Application, lines 1-17. Referring to page 5, beginning line 7 "The cavity length can be adjusted by moving the diffraction grating 320 along an axis that is parallel to the beam 340 between points A and B."

A similar description pertaining to Fig. 4 is at page 5, lines 12 and following "As with Fig. 3, modifying the distance between the gain medium 310 and the diffraction grating 320 does not change the selected wavelength. Moving the gain medium 310 only affects segment A-B of the cavity length...". (Emphasis added.)

This is readily understood with respect to Fig. 3 whereby the translation that changes the laser cavity length is along line A-B, see the arrow shown below the grating 320. Hence the translation is only along this axis, which is the parallel to the light beam axis A-B.

This advantageously solves the technical problem posed in the Background section of the Application, see page 2, beginning line 26:

> One important aspect of a tunable external cavity layer [sic – should be "laser"] is that the cavity length should be a constant multiple of the selected wavelength of light. As the output wavelength is tuned from one wavelength to another, the cavity length needs to be changed such that the number of wavelengths in the length of the external cavity laser 100 remains constant. If not, mode hop can

> occur. Mode hop is an unintended switch from the desired wavelength to a nearby wavelength. The minimization or elimination of a mode hop is highly desired.

Thus in accordance with the invention, mode hop is eliminated by the actuator configuration described at page 4, beginning line 23:

> By using two actuators, one to rotate a retroreflector (thereby selecting the wavelength of light to amplify) and one to change the cavity length, a tunable external cavity laser is created that virtually eliminates mode hop.

Thus advantageously the cavity length actuator only alters cavity length and permits the very fine adjustments needed to alter cavity length. As indicated above, this adjustment is typically less than one wavelength, where the wavelength is, for instance, 1500 nm. Thus by providing the actuator which only alters the distance between the gain medium (laser diode) and the diffraction grating along the axis defined by the laser light beam, mode hop can be eliminated without changing the wavelength.

No such structure is even suggested in the references. The first reference Jerman has, conventionally, the first actuator which is coupled to one of the diffraction grating or retroreflector for wavelength adjustment. See Figs. 10-13 of Jerman and column 4, lines 10-13.

Also provided by Jerman is his second actuator 508, see column 14, lines 27-40. The second actuator 508 however only moves the collimating lens, see column 14, lines 27-30 "Collimating lens 503 is optionally coupled to a second microactuator 508 which is capable of moving the collimating lens in a direction perpendicular to first and second beam portions 150a and 150b." However movement of the collimating lens does not affect the laser cavity length and would have no effect on mode hop. Such systems conventionally have a collimating lens to focus the laser beam. However this lens has no effect on the cavity length which of course is inherently defined by a reflective element, such as the diffraction grating. Hence while there are two actuators in Jerman, the first is the conventional one for determining the wavelength by tilting and the second is only for focusing purposes and also does not adjust the cavity length.

Hence Jerman clearly fails to meet Claim 1 as amended.

The other cited references fail to remedy this deficiency in Jerman. Anthon was not even cited by the Examiner as meeting Claim 3 and hence was not regarded by the Examiner as pertinent to the subject matter now amended into Claim 1. The same goes for the other cited references. Hence Claim 1 clearly distinguishes over the references since Claim 1 now includes the subject matter of Claim 3, and also recites "an actuator which changes a distance only along that axis." Clearly this distinguishes over the conventional wavelength adjustment actuator well known in the field and illustrated, for instance, in present Fig. 1 which allows tilting of the diffraction grating 120. If the Examiner regards this tilting as somehow changing the laser cavity length (which it clearly does not) clearly any such tilting also affects the angle of reflection and hence does more than change the distance along the optical axis from the gain medium to the diffraction grating. Clearly Claim 1 distinguishes over the references and over the system of present Fig. 1 which is essentially the same as disclosed in Jerman and Anthon. Hence Claim 1 is allowable as are all claims dependent thereon.

Independent method Claim 23 as amended includes subject matter similar to that amended into Claim 1 herein, so the final clause of Claim 23 now recites "adjusting a distance between the gain medium and the diffraction grating to control a cavity length of the laser by an actuator which changes the distance only along an axis parallel to a direction of the emitted light." Claim 23 therefore distinguishes over the references for at least reasons similar to those pointed out above in conjunction with Claim 1.

Claim 33, which is the third independent claim, has been amended to effectively include the subject matter of Claim 6, indicated as being allowable by the Examiner, so that line 6 of Claim 33 now reads "the cavity length actuator coupled to the gain medium." This is the same as the subject matter of Claim 6 indicated as being allowable by the Examiner and hence renders Claim 33 allowable.

CONCLUSION

Claims 34 to 36 were earlier withdrawn due to the restriction. Thus all pending claims are believed to be allowable and allowance thereof is requested. If the Examiner intends other action, he is requested to contact the undersigned at the telephone number given below.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required for this paper, Applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. **509232001900**.

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Respectfully submitted,

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